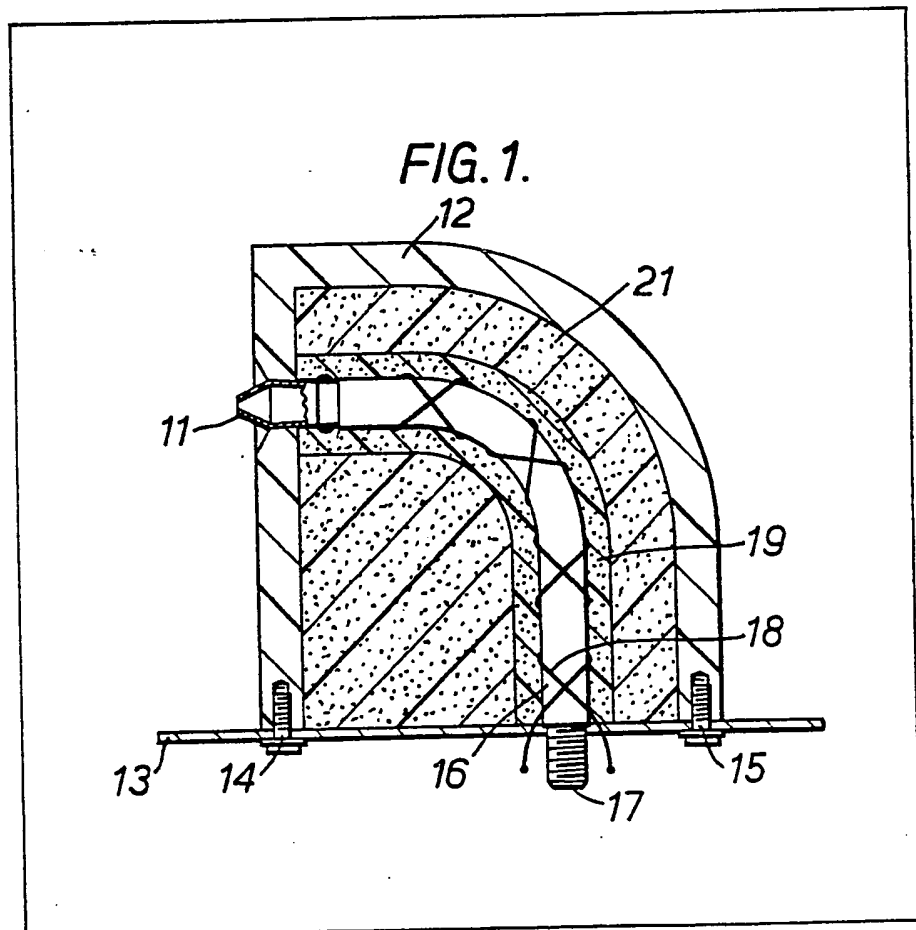


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(54) Heated screenwash

(57) In a motor vehicle screenwash, the or each fluid supply line 16 is heated by an electrical resistance heating element 18 powered by the vehicle's battery. The line or lines may be surrounded by insulation 19, 21. The fluid in the line or lines is thereby prevented from freezing during cold weather.



## SPECIFICATION

## Heated screenwash

- 5 The invention relates to the screenwashing of a motor vehicle, and in this specification the term "screen" is intended to include not only the windscreen but also the rear window and the headlamp cover of a motor vehicle.
- 10 A screenwash operating on at least the windscreen of a vehicle is now legal requirement in this country. In addition to a windscreen wash, several vehicles – notably the so called "hatch-back" style of vehicle – incorporate or can be fitted with a screenwash operative on the rear window. Additionally again, more expensive cars are now being fitted with headlamp washing systems.

- 15 All these systems have one potential drawback: if the screenwashing fluid in the supply lines freezes, the screenwash cannot operate. It is virtually unknown for the fluid in the main reservoir to freeze, but it is by no means unusual for the relatively small "thread" of residual fluid in the fine-bore supply lines to freeze quite easily and render the screenwash inoperative. Even on expensive saloon cars and sports cars, no means of overcoming this drawback exist.

- In one broad aspect, the present invention is based on the concept of heating the fluid supply lines and the final delivery nozzle by surrounding the lines with, or incorporating into them, electrical resistance heating elements powered by the vehicle's battery.

- In another broad aspect, the invention is embodied in the concept of surrounding the fluid supply line and the nozzle by a foamed plastic flexible insulating jacket.

It is within the scope of the invention to combine these two broad concepts.

- The electrical resistance heating elements may be embedded in, or carried by, flexible fabric or plastic tape which can be wrapped hellically around the existing fluid supply lines and be connected to the vehicle's battery through a switch, and/or thermostat.

- 45 Suitable tapes may for example be faced with foamed plastic insulating material, so as the tapes were wrapped around the fluid supply line they not only positioned the electrical resistance heating elements but also surrounded the lines with a foamed plastic insulating layer.

- Alternatively the electrical resistance heating elements may be incorporated into the supply lines themselves when the lines are first extruded or moulded in initial manufacture and before fitting to the vehicle.

- Alternatively again a foamed plastic insulating jacket may be moulded or extruded in one continuous length and may have the electrical resistance heating elements incorporated into it during the moulding or extrusion process. The jacket can then be cut to length to fit any given fluid supply line forming part of a vehicle's screen washing system.

- The insulating jacket could be of annular cross-section so that, in use, the fluid supply passes along its bore from the fluid reservoir to the nozzle.

The necessary heating of the nozzle could be accomplished by direct conduction of heat from the adjacent end of the heated fluid supply line through the material of which the nozzle is made. Alternatively – or additionally – the nozzle itself could be heated by electrical resistance heating elements.

- Alternatively again, or additionally, the nozzle could also be insulated with foamed plastic material; and, since the nozzle is usually exposed on the exterior of the vehicle body-work and is thus more prone than ever to freezing, it could be housed inside a special moulding incorporating the necessary insulating and/or heating means.

- A screenwash system embodying the invention may incorporate a thermostat which, when the temperature adjacent the fluid supply lines approaches zero, automatically switches on the heating elements and/or causes a warning signal to be broadcast to the vehicle driver. Such automatic operation could be especially useful where, for example, a vehicle was parked outside in freezing temperatures with the driver wholly absent until the next morning. In such a case, the fluid supply lines of the screenwash would automatically be kept heated and would be available for immediate use first thing in the morning.

- The fluid reservoir itself could be heated and/or insulated. This however is not an essential feature of the invention. The fluid supply lines themselves must be prevented from freezing.

- The accompanying drawings show, by way of example only, components of one particular heated screenwash embodying the invention. Figure 1 shows in cross-section a windscreen washer nozzle and its surrounding housing; whilst Figure 2 shows also in cross-section, part of the insulated and heated fluid supply lines of the screenwash.

- In Figure 1, a moulded hard plastic nozzle 11 is a force-fit within a rigid hollow moulded plastic shell 12. The shell 12 has a streamlined appearance, and is self-coloured to match the vehicle body work 13 to which it is secured by screws 14, 15. The angle of the nozzle can be altered so that the issuing jet of screen washing fluid strikes the windscreen at the appropriate point. Means for effecting such alteration are known in themselves.

- A relatively short length of heat resistant flexible plastic tubing 16 is a force-fit at one end over the nozzle 11. The other end 17 of the tubing projects from the bottom of the shell 12 and is ridged so that the main fluid supply line can be firmly sleeved over it.

- Electrical resistance heating elements, embedded in self-adhesive fabric tape, are wrapped around the tubing 16, as shown in Figure 1, extend as far as and around the beginning of the nozzle 11. They are given the reference numeral 18 in Figure 1. The tapes incorporate in insulating layer 19 of, for example, fibreglass wool; and the entire assembly of tubing 16, electrical tapes 18 and insulating layer 19 is embedded in an expanded polyurethane foam plastic insulation 21 which substantially fills the hollow interior of the shell 12.

- Figure 2 shows in cross-section the fluid supply lines. They consist basically of elongate flexible plas-

tic tubing 22, of identical bore and flexibility to the tubing 16 shown in Figure 1. Tapes 23 similar to the tapes 18 of Figure 1 and carrying electrical resistance heating elements are wrapped closely around the tubing 22. A circular-cylindrical insulating jacket of resilient expanded foamed plastic material 24 surrounds the tubing 22 and tapes 23.

As Figure 2 shows, one end of the supply lines is sleeved over the ridged projecting end 17 of the tubing 16. The other end, not shown in any of the drawings, is connected to the fluid reservoir from which the screen washing supply is drawn.

The electrical resistance heating elements 18, 23 are connected to the vehicle battery (not shown) through a thermostat and a switch (neither of which is shown). The switch is automatically closed "on" whenever the thermostat senses that the temperature adjacent the fluid supply lines or the nozzle shell is approaching freezing point. The switch however incorporates a master over-riding control so that it can at any time be permanently switched off by the vehicle driver and will then not respond to the thermostat until it is switched back on again.

It is found in practice that once conventional supply lines are frozen they tend not to defrost when the vehicle is moving, because the continuous stream of cold air over the fluid supply lines and the nozzle keeps them frozen. It is not uncommon for vehicles whose screen washers are initially quite free to operate, to find that after several minutes journey the lines are frozen because of this continual rush of freezing air over them and over the nozzles. A system embodying the invention seeks to overcome this difficulty.

The invention could be embodied in new vehicles before they leave the factory. It might prove easiest to combine the inner flexible fluid supply line with the insulating tubing, and to incorporate the electrical resistance heating elements during the tubing extrusion process.

Alternatively the invention could be incorporated in existing vehicles, by supplying suitable insulating "jackets" either with or without electrical resistance heating elements. The heating elements themselves could be supplied as separate tapes to be wrapped round the existing plastic flexible fluid supply lines. The insulating jacket could then follow. Figure 2a shows in an end cross-section a jacket which might be suitable for wrapping round the fluid supply lines of an existing system. The jacket is circular-cylindrical in use, but it is initially flattened out and is formed along its opposed longitudinal edges with the respective arms of a co-operating "snap" fastener 25. When the jacket is wrapped around the line tubing 26, the two halves of the "snap" fastener 25 can be pressed together along the entire length of the jacket.

Suitable specific materials will of course be apparent to those skilled in this particular art.

Where separate fluid supply lines run adjacent one another, a plurality of such lines could be surrounded by – or incorporated into – a single insulating jacket.

#### CLAIMS

1. A motor vehicle screenwash, the or each of

whose fluid supply lines is surrounded by, or incorporates, one or more electrical resistance heating elements powered – in use of the screenwash – by the vehicle's battery.

2. A screenwash according to claim 1, in which the or each line is surrounded by a flexible insulating jacket.

3. A screenwash according to claim 1 or claim 2, in which the or each heating element is embedded in or carried by flexible fabric or plastic tapes which are wrapped around the line or lines, and is connected via a switch, and/or a thermostat, to the vehicle's battery.

4. A screenwash according to claim 3, in which the tapes are faced with foamed plastic insulating material, so that as they are wrapped around the or each supply line they form an insulating jacket around the line.

5. A screenwash according to claim 2, in which the insulating jacket is an elongate moulding or extrusion.

6. A screenwash according to claim 5, in which the insulating jacket incorporates the electrical resistance heating element or elements.

7. A screenwash according to claim 5 or claim 6, in which the insulating jacket incorporates the fluid supply line or incorporates a plurality of such lines.

8. A screenwash according to claim 5 or claim 6 in which the insulating jacket is initially split longitudinally.

9. A screenwash according to claim 8, in which the insulating jacket is formed along each of the opposite edges of its longitudinal split with a respective one of the two co-operating halves of a "snap" fastener.

10. A screenwash according to claim 9, in which the insulating jacket incorporates the fluid supply line, or incorporates a plurality of such lines, and the "snap" fastening is substantially fluid-tight when fastened.

11. A screenwash according to any of the preceding claims, in which the final delivery nozzle of the or each line is also heated by one or more electrical resistance heating elements.

12. A screenwash according to claim 11, in which the nozzle is surrounded by foamed plastic insulating material.

13. A screenwash according to claim 11 or claim 12, in which the nozzle is housed inside a preformed moulding which can be attached to the vehicle's bodywork.

14. A screenwash according to any of the preceding claims, incorporating a thermostat which, in use, when the temperature adjacent the fluid supply line or lines approaches freezing point, automatically switches on the heating element or elements and/or causes a warning signal to be broadcast to the vehicle's driver.

15. A motor vehicle screenwash substantially as described herein with reference to, and as illustrated in, the accompanying drawings.

16. A motor vehicle incorporating a screenwash according to any of the preceding claims.

17. A motor vehicle screenwash, the or each of whose fluid supply lines is surrounded by a flexible

insulating jacket.

18. A screenwash according to claim 17, in which the jacket comprises foamed plastic material.

19. A screenwash according to claim 18, in which the jacket is initially split longitudinally.

20. A screenwash according to claim 19, in which each of the opposite longitudinal edges of the split is formed with a respective one of the co-operating halves of a "snap" fastener.

21. A screenwash according to claim 20, in which the insulating jacket incorporates the fluid supply line (or incorporates a plurality of such lines) and the "snap" fastening is substantially fluid-tight when fastened.

22. A motor vehicle incorporating a screenwash according to any of claim 17 to 21.

New claims or amendments to claims filed on 13/11/79

Superseded claims 1-22

#### CLAIMS

1. A motor vehicle screenwash, the or each of whose fluid supply lines terminates in a nozzle from which fluid is - in use of the screenwash - ejected; the or each line being surrounded by, or incorporating, one or more electrical resistance heating elements powered - in use of the screenwash - by the vehicle's battery; the or each line being made of flexible plastics material and being elongate; the heating element or elements surrounding, or being incorporated into, substantially the entire length of the or each line; and the arrangement being such that - in use of the screenwash - the or each nozzle is also heated by the heating element or elements surrounding the or each associated line.

2. A screenwash according to claim 1, in which the nozzle (or one of the nozzles) is heated only by direct conduction of heat from the adjacent end region of the heated supply line.

3. A screenwash according to claim 1, in which the nozzle (or one of the nozzles) is in contact with, or incorporates, an electrical resistance heating element and is heated - in use of the screenwash - by said element.

4. A screenwash according to any of the preceding claims, in which the line (or one of the lines) is surrounded over substantially the whole of its length by an insulating jacket of flexible foamed plastics material.

5. A screenwash according to claim 4, in which the insulating jacket is initially formed separately from the supply line, and is split longitudinally so that it can subsequently be sleeved over the supply line.

6. A screenwash according to claim 4 or claim 5 in which the jacket is split longitudinally and is formed, along each of the edges of its longitudinal split, with a respective one of the two co-operating halves of a "snap" fastener.

7. A screenwash according to claim 6, in which the "snap" fastening is substantially fluid-tight when fastened.

8. A screenwash according to claim 4, in which the insulating jacket, and one or more supply lines,

are effectively formed integrally with one another by so moulding a length of elongate foamed plastics material as to incorporate one or more elongate bores extending along substantially the entire length of the material.

9. A screenwash according to any of the preceding claims, in which the nozzle (or one of the nozzles) is surrounded by foamed plastics insulating material.

10. A screenwash according to any of the preceding claims, in which the nozzle (or one of the nozzles) is housed inside a preformed moulding which can be attached to the vehicle's bodywork.

11. A screenwash according to any of the preceding claims, incorporating a thermostat which, in use, when the temperature adjacent the supply line or lines approaches zero, automatically switches on the heating elements and/or causes a warning signal to be broadcast to the vehicle's driver.

12. A screenwash according to any preceding claim, in which the or each heating element is embedded in or carried by flexible fabric or plastics tapes which are wrapped around the line or lines, the or each element being connected - in use - via a switch, and/or a thermostat, to the vehicle's battery.

13. A screenwash according to claim 12, in which the tapes are faced with foamed plastics insulating material, so that as they are wrapped around the or each supply line they form an insulating jacket around the line.

14. A motor vehicle screenwash substantially as described herein with reference to, and as illustrated in, the accompanying drawings.

15. A motor vehicle incorporating a screenwash according to any of the preceding claims.

16. An elongate, flexible plastics, fluid supply line terminating in a nozzle and suitable for incorporation into a screenwash according to any of claims 1 to 14 or a motor vehicle according to claim 15, the line incorporating, or being surrounded by, one or more of said electrical resistance heating elements along substantially the entire length of the line.

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FIG. 1.

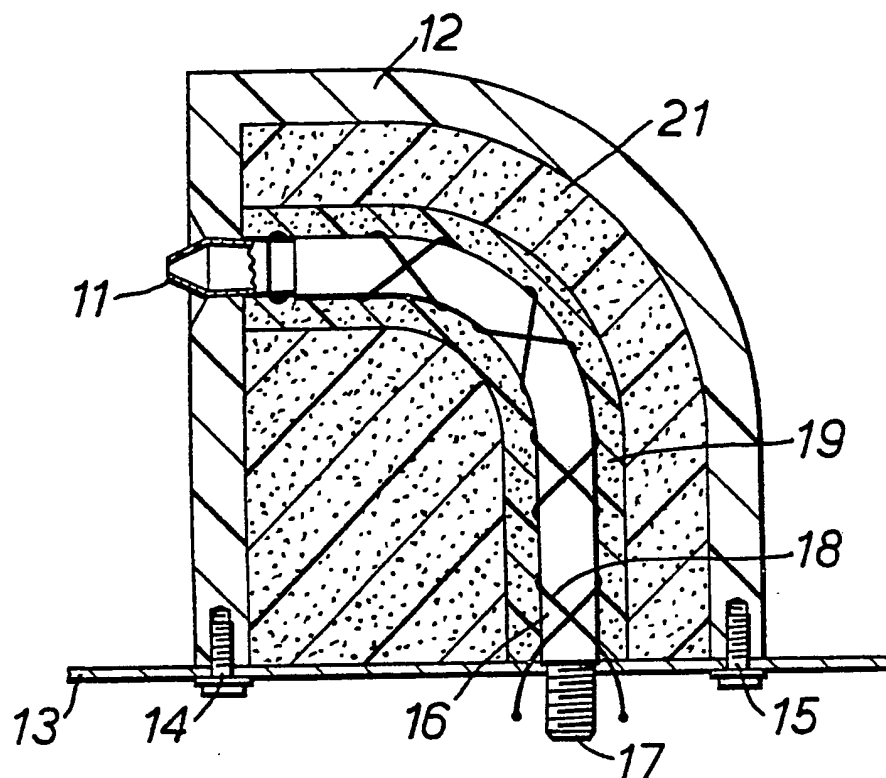


FIG. 2.

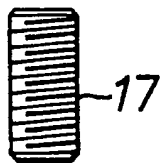


FIG. 2A.

